REMARKS/ARGUMENTS

Favorable reconsideration of this application is respectfully requested.

Claims 5-8 and 13-20 are pending in this application. Claims 5-8 and 13-20 were rejected under 35 U.S.C. § 102(b) as anticipated by U.S. patent 5,659,355 to Barron et al. (herein "Barron").

Addressing the above-noted rejection, each of the claims is believed to clearly distinguish over Barron.

Applicants respectfully submit that the applied art to Barron does not teach or suggest in the claimed image reading apparatuses that a "black reference value is a ***moving average*** of the black reference values" (emphasis added). The outstanding Office Action cites Barron to disclose such subject matter, but applicants respectfully submit that what Barron in fact discloses is not utilizing "a moving average of the black reference values", as discussed in further detail below.

As previously described by the applicants, the present applicants recognized that in an image reading apparatus a peak value of an image signal varies due to variation in the color of the background of the original image. In many cases, the original image read by the image reading apparatus is an image printed on a paper sheet. Usually, the above-mentioned color of the background of the original image is the color of the paper sheet. The color of the paper sheet is usually white. However, when the paper sheet on which the original image is printed is not white, but is a color such as red, the peak value of the image signal varies with the color of the paper sheet. As a result, the output of the peak hold portion 4 varies, and the reference voltage of the A-D converting portion 3 varies. Consequently, the level of the black offset that must be eliminated from the original image through the black shading correction formed by the black shading correction portion 5 may vary.[1]

[1] Specification, pages 8-9.

When the signal-to-noise ratio (S/N ratio) of the image reading apparatus is poor, variation in the average of the outputs of the photoelectric sensors of the OPB portion occurs due to noise. As a result, the black reference level used for the black shading correction may vary for each line due to noise. When the black reference level varies for each line, a pattern of lateral stripes may develop in the image represented in the image signal.[2]

As described in the non-limiting description in the specification at pages 27-28, and as depicted in the non-limiting illustration of Figure 5, the analog image signal output by the CCD portion 1 undergoes signal processing by the signal processing portion 2. Then, the analog image signal is converted into a digital image signal by the A-D converting portion 3. The digital image signal output from the A-D converting portion 3 is input into the black shading correction portion 25, and undergoes black shading correction. The average calculating circuit 17 of the black shading correction portion 25 calculates the average of outputs of the OPB portion of the CCD portion 1. Then, the average calculating circuit 17 outputs the calculated average Dopb. The moving-average circuit 29, which receives the average Dopb, calculates a moving average Db,n. The moving average Db,n represents the average, in the sub-scan direction of (m + 1) averages, each of which is the average in the main scan direction, and outputs the moving average Db,n to the subtracter 18. The moving average Db,n is obtained as a result of a moving-average calculation performed using the average Dopb n-m for the (n - m)th line (mth previous line) through the average Dopb, and for the nth line (current line). The subtracter 18, which has received the moving average Db,n, subtracts the moving average Db,n from the data D0 of the image signal output from the A-D converting portion 3 when the original image is read, and outputs this obtained data to the white shading correction portion 6.

[2] Id. at page 9, line 19 - page 10, line 10.

In the moving average circuit 29, as depicted, for example, in the non-limiting illustrations of Figures 5 and 6, no feedback circuit is included, and there is no repeated summation of a current value and a once-weighted average value. M averages for a main scan line are latched in M latches in sequence. Then, the M averages for a main scan line thus latched are further averaged for the sub-scan direction by an average calculating portion 31. Accordingly, it is possible to remove the influence of previous data after M lines are processed.

To this end, claims 5 and 7 recite "the black reference level is a moving average of the black reference values." Claims 13 and 15 recite that "the black reference level for each line is obtained for moving-averaging the black reference levels for the plurality of lines." Those features distinguish over Barron.

According to Barron, in a black level correction for a digital camera, see specifically Barron at column 3, line 49 to column 4, line 23, ten black pixels are provided at a top of each line of CCD pixels as shown in Figure 1, and then, as shown in Figure 4, a clamp level of a DAC (digital-to-analog converter) 24 shown in Figure 2 is updated for each line with the use of an average of all of the black pixel outputs until that point.

Specifically, according to Barron, for a first line an average of the black pixel outputs on the same line is used; for a second line, an average of the black pixel outputs on the first and second lines is used,...; for a sixteenth line, an average of the black pixel outputs on the first through sixteenth lines are used. Thus, in Barron, as the processing proceeds, the number of lines of pixels used for taking an average gradually accordingly increases, for the purpose of updating the clamp value of the DAC 24.

Applicants submit that such a scheme of Barron is not in fact a "moving average", as recited in the pending claims. According to the present invention, a number of lines of black pixels (an OPB (optical black) portion for example shown in Figure 1 of the present

application) used to take an average therefrom is fixed, for example sixteen, and always an immediately preceding (or last) sixteen lines of the black pixels in this example (i.e., Dopb,n, Dopbn-1, DOPBn-2,..., Dopb n-m, as shown in Figure 6 of the present application) are used to take an average therefrom. The "moving average" is thus a fixed number of lines of the black pixels, which fixed number of lines shifts.

In other words, according to Barron the lines of pixels used for taking an average increases gradually. In contrast to Barron, according to the present invention the lines of pixels used for taking an average do not increase but merely move/shift gradually, but to keep the number of lines being taken unchanged. Thus, what the claimed invention sets forth is taking a "moving average". Barron does not disclose or suggest taking a moving average as the number lines of lines of pixels increases.

In such ways, each of the claims are believed to clearly distinguish over the teachings in Barron.

As no other issues are pending in this application, it is respectfully submitted that the present application is now in condition for allowance, and it is hereby respectfully requested that this case be passed to issue.

Respectfully submitted,

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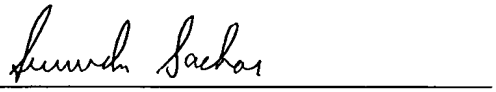

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